PRICE VS. QUALITY: INFLECTION POINT IN RATIONAL CONSUMPTION

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Abstract: This paper explores the complex relationship between price and quality, suggesting an inflection point at which price increases no longer provide significant improvements in product quality. Initially, a linear growth is observed where price increases are accompanied by perceptible improvements in quality. However, as seen in the Law of Diminishing Returns, the rate of improvement begins to decrease after a certain point, leading to quality saturation and reduced return on investment. The inflection point represents the moment when the consumer must consider whether the additional cost is justifiable in terms of added value. Furthermore, the article discusses the influence of factors unrelated to quality, such as brand prestige and social status, especially after the inflection point, and applies these concepts to sectors such as technology, automobiles, and fashion. Understanding this dynamic is essential for consumers seeking informed purchasing decisions and for companies aiming to develop efficient pricing strategies.

Keywords: Price vs. Quality, Inflection Point, Law of Diminishing Returns, Quality Saturation, Perceived Value, Prestige Products, Veblen Goods, Pricing Strategies, Consumer Behavior, Cost-Benefit Analysis.

1. INTRODUCTION

In the context of economic theory and consumer behavior, the relationship between price and quality plays a fundamental role in the formulation of pricing strategies and product positioning in the market. It is often assumed that a higher price corresponds to superior quality. However, this relationship is not always linear, and there may exist an inflection point beyond which price increases do not result in proportional improvements in perceived quality. This article aims to explore the nuances of this relationship, using economic theories and practical examples to illustrate the evolution of consumer value perception.

In the initial stage of the price-quality curve, there is an apparently linear relationship: price increases are generally associated with noticeable improvements in product or service quality. This scenario is supported by classical utility theory, where rational consumers allocate their budget to maximize perceived satisfaction (or utility).

For instance, when comparing mattresses costing R$ 1.000,00 and R$ 2.000,00 differences in comfort, durability, and physical support are noticeable. Studies indicate that in this price range, improvements in quality still accompany additional investments, justifying the higher price due to the superiority of the product in tangible attributes such as material density, resistance, and extended warranty (Lancaster, 1966). These factors translate into added value that consumers can clearly perceive and quantify, justifying the higher cost.

However, as the price continues to rise, the rate of quality improvement begins to diminish, following the principle of the Law of Diminishing Returns. The Law of Diminishing Returns, a fundamental concept in microeconomics, states that after a certain point, each additional unit of investment in a production factor results in a proportionally smaller increase in the final product (Marshall, 1890). In the context of consumption, this concept applies to the relationship between a product's price and its perceived quality.

For example, when the price of a smartphone increases from R$ 4.000,00 to R$ 8.000,00 the quality in terms of additional features, durability, and performance does not necessarily double. Over time, the additional benefits provided by the extra investment become marginal, especially in terms of features that may be significant to the average consumer, such as a better camera or a faster processor, whose improvements may be imperceptible in daily use.

2. QUALITY SATURATION AND TECHNOLOGICAL LIMITATIONS

Quality saturation occurs when a product reaches its maximum potential due to technological or material limitations. At this point, the cost-benefit ratio for the consumer begins to deteriorate. Thus, additional price increases do not result in significant improvements in the functional quality of the product (Rosen, 1974). The theory of quality saturation suggests that once the performance limit that a technology can offer is reached, subsequent price increases tend to be attributed to other non-functional factors.

This phenomenon is evident in the automotive industry. Luxury vehicles from different brands may have superior performance, but price increases beyond a certain level are more due to characteristics such as exotic finishing materials or exclusive entertainment systems, rather than fundamental improvements in car performance, such as fuel efficiency or safety.

3. INFLECTION POINT: WHEN PRICE EXCEEDS PERCEIVED QUALITY

The inflection point is the critical point on the price-quality curve where additional costs no longer provide proportional improvements in perceived quality. This concept, similar to the economic concept of the "paradox of diminishing marginal utility," explains why consumers often opt for value-intermediate alternatives instead of products with extreme features and prices. In practice, a rational consumer, recognizing the inflection point, will be more willing to pay for a version with sufficient quality rather than pursuing additional features that do not result in proportional benefits (Thaler, 1985).

This inflection point is particularly significant in consumer technology segments. Consumers are frequently faced with the decision of investing in a more expensive model of a smartphone, for example, which offers incremental features, such as a slightly better camera, that may not justify a substantial price increase.

Mcconnell (1968), in his research presented in the article "The Price-Quality Relationship in an Experimental Setting," provides an important basis for understanding the relationship between price and perceived quality. The researcher identified that, although consumers often associate higher prices with superior quality, this relationship is not linear and presents behavior similar to the inflection point discussed in this article. In his experiments, it was observed that after a certain price level, the perception of quality continued to increase, but at a decelerated pace, indicating a point at which the impact of price on quality perception becomes less and less significant. This behavior reinforces the hypothesis that there is a limit to the perceived improvement that the additional price can offer, which coincides with the inflection point analyzed in this work. Thus, Mcconnell's research contributes to the empirical validation of the idea that, beyond a certain point, the relationship between price and quality becomes increasingly less proportional, highlighting the role of psychological and contextual factors in consumer behavior.

4. FACTORS BEYOND QUALITY: BRAND AND SOCIAL STATUS

After the inflection point, price increases often reflect intangible characteristics, such as brand prestige, exclusivity, and social status. Goods that are desired primarily for the symbolic value associated with their high cost are called "Veblen Goods," named after economist Thorstein Veblen, who identified conspicuous consumption behavior (Veblen, 1899). For these products, quality may even be equivalent to more affordable items, but the appeal lies in their rarity and the social recognition they provide.

The phenomenon of Veblen goods is evident in sectors such as fashion and luxury items. The perceived value of a designer handbag derives not only from the quality of the material or functionality but from the exclusivity it represents. The brand adds value to the product by establishing an emotional and social connection that transcends the item's physical utility.

5. PRACTICAL APPLICATIONS IN DIFFERENT SECTORS

The relationship between price and quality and the inflection point have important practical applications in various sectors:

- **Technology**: Premium smartphones often cost significantly more than intermediate models, but the improvements are frequently incremental. This means that consumers are paying a large price difference for features that offer limited practical benefits in daily use.
- **Automobiles**: Luxury cars generally show price increments that are not proportional to the extra functional benefits offered. Features such as sophisticated finishes and high-definition sound systems add value but do not improve the fundamental performance of the vehicle.
- **Fashion**: The fashion and luxury goods sector is perhaps the most emblematic regarding the inflection point. Beyond a certain quality level, price increases are more related to design, brand, and exclusivity than to attributes like durability or comfort.

6. DEVELOPMENT OF NA MVP

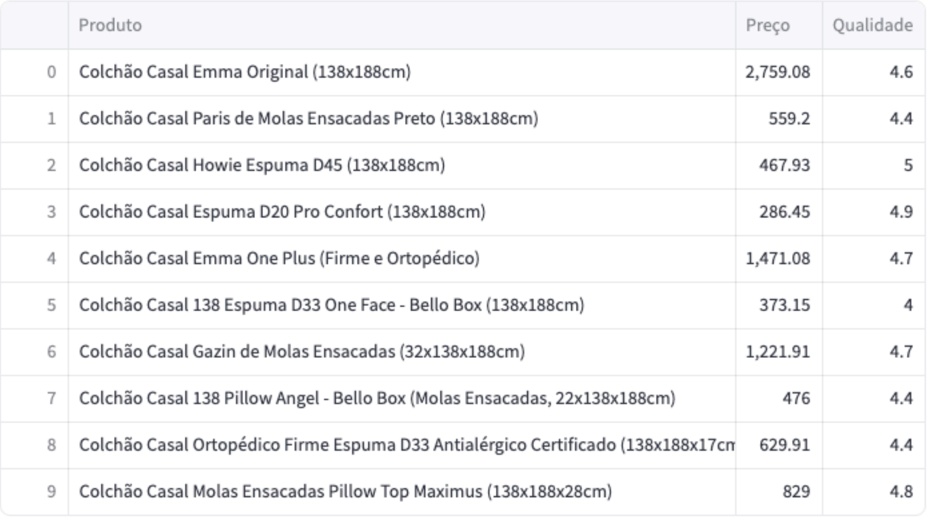
To empirically validate the hypothesis of the inflection point between price and quality, an MVP (Minimum Viable Product) was developed in Python. The MVP was designed to analyze the relationship between the price of different products and their quality, using a statistical model that evaluates the inflection point at which a price increase no longer results in significant improvements in perceived quality.

For the implementation, a Python interface with Streamlit was used, which allows users to load price and quality data through Excel or CSV files. Users could upload the data, and the MVP would perform the analysis and visualize the results.

6.1 METHODOLOGY

The case study focused on mattresses, a product category where comfort and durability are essential quality factors, and where consumers generally perceive a direct relationship between price and quality. The methodology involved:

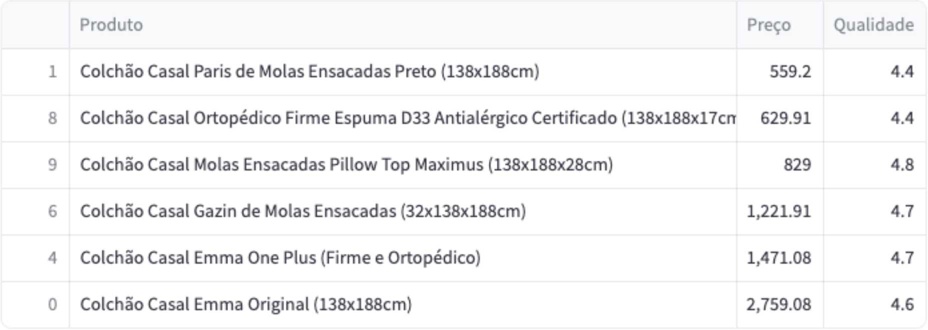
Data Collection: Data on mattresses sold in online stores like Magazine Luiza and Mercado Livre were collected. Prices ranged from R$ 500.00 to R$ 2,759.08, representing a wide range of available market options. For quality, data from user reviews and ratings were collected, on a scale from 0 (lowest rating) to 5 (highest rating).



	Produto	Preço	Qualidade
0	Colchão Casal Emma Original (138x188cm)	2,759.08	4.6
1	Colchão Casal Paris de Molas Ensacadas Preto (138x188cm)	559.2	4.4
2	Colchão Casal Howie Espuma D45 (138x188cm)	467.93	5
3	Colchão Casal Espuma D20 Pro Confort (138x188cm)	286.45	4.9
4	Colchão Casal Emma One Plus (Firme e Ortopédico)	1,471.08	4.7
5	Colchão Casal 138 Espuma D33 One Face - Bello Box (138x188cm)	373.15	4
6	Colchão Casal Gazin de Molas Ensacadas (32x138x188cm)	1,221.91	4.7
7	Colchão Casal 138 Pillow Angel - Bello Box (Molas Ensacadas, 22x138x188cm)	476	4.4
8	Colchão Casal Ortopédico Firme Espuma D33 Antialérgico Certificado (138x188x17c	629.91	4.4
9	Colchão Casal Molas Ensacadas Pillow Top Maximus (138x188x28cm)	829	4.8

(Image 1 – Data loaded)

Data Filtering: After collection, the data were filtered to include only those within the defined range, aiming for an analysis focused on products with higher sales volume and greater quality variability.



	Produto	Preço	Qualidade
1	Colchão Casal Paris de Molas Ensacadas Preto (138x188cm)	559.2	4.4
8	Colchão Casal Ortopédico Firme Espuma D33 Antialérgico Certificado (138x188x17cm	629.91	4.4
9	Colchão Casal Molas Ensacadas Pillow Top Maximus (138x188x28cm)	829	4.8
6	Colchão Casal Gazin de Molas Ensacadas (32x138x188cm)	1,221.91	4.7
4	Colchão Casal Emma One Plus (Firme e Ortopédico)	1,471.08	4.7
0	Colchão Casal Emma Original (138x188cm)	2,759.08	4.6

(Imagem2 – Data after processing)

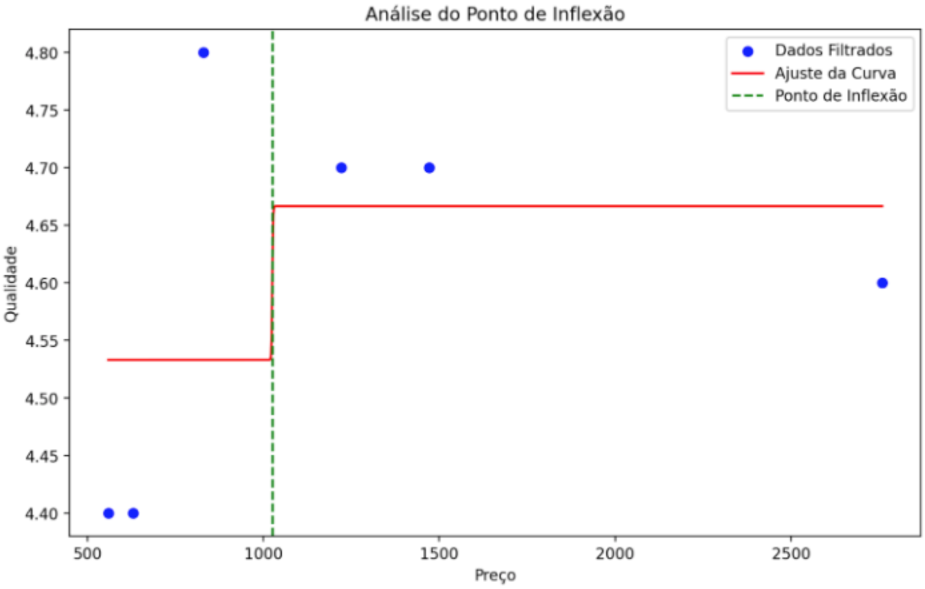
Statistical Modeling: A non-linear regression model was used to determine the relationship between price and quality, applying derivatives to identify the inflection point on the price-quality curve.

Results Visualization: Graphs were generated to illustrate the relationship and highlight the identified inflection point.

6.2 RESULTS

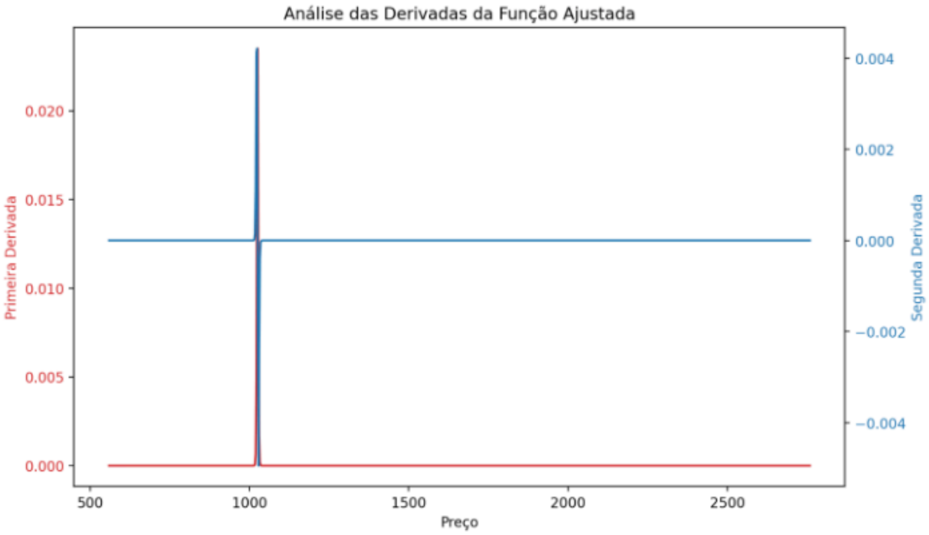
The results showed that the inflection point occurred at a price of approximately R$ 1,026.04, with a perceived quality of 4.62 on a scale from 1 to 5. This indicates that up to the value of R$ 1,026.04, the price increase was associated with a significant improvement in the perceived quality of the mattress. However, after this value, quality increments became marginally smaller, suggesting a decrease in the return on investment.

The graph generated by the MVP showed a curve that stabilizes after the inflection point, indicating that consumers seeking sufficient quality mattresses could find ideal options within this price range without having to pay for more expensive products that did not offer proportional improvements.



(Graph 1 – Price and Quality relatioship)

The results obtained with the MVP reinforce the concept of diminishing returns and the inflection point. They show that for products like mattresses, there is a limit beyond which price increases do not translate into a proportional improvement in perceived quality. This is particularly relevant in a rational consumption scenario, where the objective is to maximize the cost-benefit ratio.



(Graph 2 – Derivative Analysis)

Moreover, the study highlighted the importance of other factors, such as brand and prestige, which begin to play an important role after the inflection point. Products with prices significantly above the inflection point tend to justify the additional cost through attributes such as status and exclusivity, rather than tangible functional improvements. This reinforces the relevance of the concept of Veblen goods, where the symbolic value associated with the product may become the main factor of attraction for certain consumers.

7. FINAL CONSIDERATIONS

Understanding the dynamics between price and quality is crucial for both consumers and companies. For companies, it is important to define pricing strategies that align with consumer value perception, ensuring that prices reflect clear benefits, especially before the inflection point. For consumers, a cost-benefit analysis helps identify when paying more does not provide sufficient additional value to justify the investment.

"Value-based pricing" strategies can be adopted to capture the perceived value of consumers before the inflection point, while "premium pricing" strategies are better suited to capture the symbolic value in Veblen goods. Furthermore, analyzing the product life cycle and its differential characteristics can help companies manage their portfolios to maximize profitability.

At the conclusion of this article, it is relevant to make a correlation between the proposed inflection point and the behavioral economics theories developed by Daniel Kahneman. In his work, Kahneman explores how consumers' decisions are not always rationally calculated but often influenced by cognitive biases and emotions, as described in his book "Thinking, Fast and Slow" (Kahneman, 2011).

The inflection point discussed in this article can be understood as a boundary that separates predominantly rational purchasing decisions from emotional ones. Before the inflection point, consumers tend to act more rationally, seeking to maximize the utility of their investment and objectively evaluating cost-benefit. In this scenario, Kahneman's "slow" thinking prevails, with consumers carefully analyzing product features and making comparisons to justify the price paid.

However, after the inflection point, decision-making is often influenced by emotional and subjective factors, such as prestige, social status, and symbolic value perception — aspects that Kahneman associates with "fast" thinking, which is more intuitive and driven by psychological factors. In this price range, the decision to pay more is not necessarily linked to an objective functional improvement but to emotional perception and the desire for differentiation, aligning with the concept of Veblen goods, where a product's value is driven by social recognition associated with its high price.

Thus, the inflection point can be seen as a conceptual divide between rational purchases, where perceived quality corresponds to tangible value, and emotional purchases, where other psychological and subjective factors play a crucial role in consumer decision-making. This duality is essential to understanding consumption behavior in different contexts, emphasizing the importance of integrating traditional economic perspectives with insights from behavioral economics for a more comprehensive market analysis.

The relationship between price and quality is complex and does not follow an infinite linear improvement trajectory. Understanding the inflection point in this relationship allows consumers to make more informed choices and companies to develop more efficient and market-appropriate pricing strategies. Recognizing that beyond a certain point, increasing prices do not result in additional functional value but instead provide symbolic value, is fundamental to conscious consumption and the sustainable development of products that add real value to consumers. Thus, understanding this dynamic facilitates the optimization of marketing and management strategies, both for suppliers and consumers.

As future steps for research, it would be interesting to explore the application of the inflection point concept to different product categories to verify if the behavior observed in mattresses and other discussed examples remains consistent across other market sectors. Additionally, the research could be expanded to analyze how intangible characteristics, such as brand value and cultural perceptions, influence the inflection point in different economic and cultural contexts. Another approach would be the development of a predictive model using machine learning techniques to identify the inflection point in real-time, allowing companies to adjust their pricing strategies based on dynamic market data. Conducting experimental studies that directly investigate consumer behavior concerning price and quality could also provide more detailed insights into the transition between rational and emotional decision-making during the purchasing process.

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